

CITY OF OAK RIDGE WINTER WEATHER PLAN

The Winter Weather Plan has been developed in order to plan and prepare for winter weather events when they occur. The Operations Manager will review the current version of the “Winter Weather Plan” with key staff members in October of each year and make any required changes due to technology, staffing, equipment, material availability, and other factors.

BACKGROUND

All Public Works field personnel are considered essential employees, and as such, are expected to report to work when called upon in the event of adverse winter weather. Essential employees may also be asked to report earlier or later than the normal workday starting time, work overtime, work a different shift or on weekends and holidays depending on the nature of the weather emergency. Exceptions must be requested in advance and approved by the employee’s supervisor and manager. Every employee will have a role to play in support of the snow removal operations effort to help keep the streets safe and restore streets to normal as soon as possible after the weather event.

ORGANIZATIONAL STRUCTURE FOR WINTER WEATHER RESPONSE

The Operations Manager for the Streets, Facilities, Stormwater and Fleet Maintenance Division is the Lead Coordinator of the Winter Weather Plan and serves as the primary liaison with Emergency Services during winter weather events. Once the plan has been put into operation a designated Snow Team Leader and an assistant will be in charge of the operations and will have full authority to contact the required staff members to report for duty and to implement the plan. The Snow Team Leaders and their assistants will alternate weeks to be the person contacted for the initial response to a storm. The assigned response week will coincide with the standby week which begins at 7:30 am each Monday. A schedule will be posted with the Public Safety Dispatchers showing the first person to contact during a winter weather event.

Public Works is responsible for the removal of snow and ice from building entrance landings, steps and walks for most buildings while the Parks Division will be responsible for the Civic Center complex and the other Recreation and Parks buildings.

ADVANCED PREPARATIONS

Every year on or before the 15th of October, the Lead Coordinator of the Winter Weather Plan is responsible for the following:

- Finalize strategies for any changes to the Winter Weather Plans
- Appoint the Snow Team Leaders and assistants who will be in charge of operations
- Confirm the stock of salt, ice melt and sand and advise Materials Management to order as necessary
- Inventory and prepare the brine manufacturing and distribution equipment
- Establish any required new or refresher training of personnel
- Designate the lead person to prepare the trucks for winter weather and to operationally test all snow removal and salt spreading equipment.

PRE-EVENT MEETING

Approximately 3 days before the first forecasted snow or ice event, the Operations Manager will schedule a meeting of the Winter Weather Team at the Central Services Complex. Attendees at this meeting will include:

City Manager

Public Works Director and Managers

Electric Department Director and/or designee

Public Safety Chiefs and Key Personnel

Public Works Snow Team Leaders and assistants who will be in charge of operations

Fleet and Streets Maintenance Manager

Utility Crew Chiefs

Equipment Shop Crew Chief

Other Management or Field personnel deemed essential for the predicted event

This purpose of the pre-event meeting is to discuss the specifics of the imminent weather event. The agenda for this meeting will include:

- A review of the weather forecast including live National Weather Service briefings
- Staffing level contingencies and any modifications to staff work schedules, shift reporting times or job assignments
- Informing personnel to be prepared to return to work if needed
- Scheduling of brine pre-treatment application
- Verify the operation of equipment and install chains (Equipment Shop)
- Availability of salt, brine, sand and/or other ice melt products
- A review of the status of scheduled City events and facilities affected
- Preparing the Winter Weather Headquarters and check communications

PRIOR TO THE PREDICTED EVENT

After a winter weather storm has been predicted and if weather conditions are favorable the Public Works Department will begin to pre-treat the streets with a salt brine solution. The streets will be treated in the same general order and designation as the snow removal priority listing. Brine application will take place on as many of the level 1, 2 and 3 streets as possible prior to the event. Due to the size of the equipment needed to distribute the brine most Level 4 streets will not be pre-treated.

Brine is applied as a liquid (with a freezing temperature of approximately 6 degrees) to road surfaces in advance of a predicted snow event. Ideally, pre-storm applications are done during dry weather, allowing the brine to dry completely and become embedded into the asphalt before frozen precipitation (snow/ice) arrives. When snow hits the asphalt the brine activates and immediately lowers the freezing point of water. The melting process does not happen immediately. Streets may appear to be completely snow covered, but don't be deceived. The objective of brine is to prevent the bond of ice or snow to the roadway, not to melt it; which allows for smooth and easy plowing during the weather event.

The industry refers to this a “squeegee” removal process rather than plowing as the plows are equipped with rubber strips which make contact with the pavement. These rubber strips are used to protect the pavement markings and reflectors that are used on many of the City streets.

The Public Works Department utilizes salt brine as a tool in managing frozen precipitation on roadways during the winter season. Using salt brine can provide city staff with additional time to respond to freezing precipitation. In addition, the application of salt brine may reduce the need to call in employees on an overtime basis to treat bridges and overpasses that have a tendency to freeze or when small snow showers pass through the area overnight and leave a dusting on the roadways.

DURING THE WEATHER EVENT

PLAN IMPLEMENTATION PROCEDURE AND NOTIFICATION

- The Lead Coordinator will make the decision to implement the plan and mobilize the appropriate level of staffing previously discussed during the pre-event meeting
- Each Snow Team Leader and Assistant will contact their assigned personnel to verify the adequate staffing required to implement the plan.
- Personnel who are on Public Works standby status will not be called for snow removal except in times of extreme emergency. On Sunday the personnel scheduled to begin standby on Monday will not be scheduled in the same manner as the current standby crew.
- Staff members will report to the Snow Management Crew Chief or assistant for assignment as soon as possible.
- During extreme snow events a 12 hour on /12 hour off shift may be implemented. This may also include lodging being obtained for personnel in order to maintain the level of staffing necessary to perform any duties required by the Public Works Department

THE SNOW PLAN

This plan is a prioritization system for clearing streets and supporting the public safety and health system (Police, Fire, Ambulance Service and Hospital) during snow and ice events. The Public Works Department’s ability to clear routes depends heavily on the amount of precipitation received and the temperature.

SNOW and ICE REMOVAL PRIORITIES

The City maintained streets have been prioritized into four categories according to volume of traffic and public health and safety factors.

- **Level 1:** State Highways and Hospital Routes
- **Level 2:** Arterial Streets, feeder streets to State highways and known trouble spots such as hills and shady areas.
- **Level 3:** Collector streets, streets providing access to subdivisions and the main Connector streets at the neighborhood level.

- **Level 4:** All other local neighborhood streets are categorized as Level 4. Many of these streets have on-street parking and provide minimal turning space for snowplows. The decision and ability of the Public Works Department to clear Level 4 routes is based on a number of factors including current and predicted weather conditions, salt/chemical reserves and the threat of additional inclement weather.

IMPLEMENTATION

When snow begins to cover roads, Public Works crews spread salt and/or plow all Level 1 streets and Hospital Routes. Crews also respond to emergency requests for assistance from the E-911 dispatch center. E-911 emergency requests (life safety) are handled as priority calls throughout an entire snow event. Crews will continue to focus all available resources on Level 1 streets until all routes are in a passable condition.

Once Level 1 streets are cleared, crews will then transition to Level 2 streets and routine trouble areas.

Level III streets will ONLY be cleared after Level I & II streets are completed. The decision and ability of the Public Works Department to clear Level III routes is based on a number of factors including current weather conditions, salt/chemical reserves and the threat of additional inclement weather.

As conditions warrant, Public Works equipment operators will begin snow removal from highways, bridges and streets based on the pre-approved, prioritized plan. This plan has been developed to first clear the streets that carry the highest volume of traffic and the main access routes to the hospital. All Level 1 streets will be cleared until a satisfactory level of service has been achieved before the Level 2 streets are cleared.

If additional snowfall covers the Level 1 streets again, the concentration of service will return to Level 1 until they have again been cleared at which time clearing operations will resume on Level 2 streets. This plowing will continue until all Level 1 and 2 streets have achieved the satisfactory level of service.

After Level 1 and 2 streets are cleared, a decision when to begin the treatment of Level 3 and 4 streets will be determined by several factors including the timing and amount of the precipitation along with the current and predicted weather conditions and available materials and personnel. More information on Salt Brine and the traditional salting and plowing methods is listed on the following pages and a complete listing of streets in each category is listed at the end of the plan.

WINTER WEATHER OPERATIONS - SNOW and ICE REMOVAL

SNOW FIGHTING RESOURCES

During winter weather events, the City of Oak Ridge Public Works Department has up to 45 employees and 12 pieces of equipment available to clear streets and support emergency services. The Public Works Department uses salt, calcium chloride, truck mounted snow plows and trailer mounted de-icing solution distributors to clear streets during an event. Sand and other aggregates are also used for some specific applications such as steep roadways.

Salt - dissolved salt adds foreign particles into water to lower the freezing point below 32 degrees and improved melting.

Calcium Chloride - highly affective chemical agent used with salt or sand to increase the melting process even at extremely low temperatures.

Plowing – truck mounted plows are used to move large volumes of snow from primary travel lanes to the edge or side of the street. Plows are very effective during heavy snow events but are not very effective during light dustings up to an inch or two of snow.

Sand/Aggregates – fine aggregates do little to directly affect the melting process, but sand placed on top of ice and snow adds friction/traction for vehicles and pedestrians. Dark sands will absorb heat from sun light and provide some thermal benefits for melting.

HOW BRINE WORKS

Brine is applied to road surfaces several days in advance of a predicted snow event. Ideally, pre-applications are done during dry weather, allowing the brine to dry completely and embed into the asphalt before freezing precipitation (snow/ice) arrives. When snow hits the asphalt the brine activates and immediately lowers the freezing point of water. The melting process does not happen immediately. Streets may appear snow covered, but don't be deceived. The objective of brine is to prevent the bond of ice or snow to the roadway, not to melt it; therefore allowing smooth, easy plowing during the weather event. The industry refers to this a "squeegee" removal process rather than plowing as the plows are equipped with rubber strips which make contact with the pavement.

An additional positive is that the brine will stay bound to the asphalt even after the snow and ice has been removed from the surface. Studies show that when rock salt is spread onto the street up to 30% of this material bounces to the curb or the shoulder and when a treated street is plowed, most of the salt is pushed off the road surface along with the snow.

The perfect solution of Brine is a 20 to 23.3% concentration of salt which will withstand freezing temperatures down to -6 degrees and the streets can be treated with air temperatures as low as 10 degrees. The City has technicians who will closely monitor the brine production and test each batch to assure that the concentration is within the required parameters.

City of Oak Ridge Brine Information

- Brine is mixed at the Public Works Complex. The operation consists of a brine mixing machine producing 2000 gallons per hour and two 5000 gallon tanks.
- When needed, brine is transferred to two 1,000 gallon tanks mounted on trailers, taking approximately 15 minutes to fill each trailer.
- Brine is applied (gravity fed) at a flow rate of approximately 40 gallons per lane mile.
- Public Works pre-treats approximately 134 lane miles for the city's Level 1 and 2 streets and time permitting will pre-treat as many of the Level 3 streets (100 lane miles) as possible.
- Improve road conditions at the onset of freezing precipitation.
- Provide city staff with time to mobilize and respond to freezing precipitation.
- Provide protection from frosting of bridges, hills and other problematic roadways.
- Reduce the cost of snow removal service

FREQUENTLY ASKED QUESTIONS ABOUT SNOW REMOVAL

1. Who removes snow and ice from the City's streets?

The City of Oak Ridge Public Works Department is responsible for planning and administering the Snow and Ice Removal Plan.

2. Who clears the roads at the DOE facilities?

The Department of Energy or their contractors maintains the privately controlled roads

3. When does the City start the Snow and Ice Removal Plan?

The City is prepared for all weather events and will begin snow and ice removal as soon as the conditions warrant.

4. What is a snow emergency route?

Emergency routes, or hospital routes, are those routes that lead to the Methodist Medical Center. However, during an event, the Public Works Department also responds to specific emergency situations as requested by the 911 Dispatch Center to assist the Oak Ridge Police and Fire Departments and the Anderson County Ambulance Service.

5. What constitutes the Level number for routes?

Level I streets are the State highways, streets carrying the highest volume of traffic and hospital routes.

Level II routes are streets connecting to the main streets, along with feeder streets to connecting streets.

Level III routes are main streets and connections at the neighborhood level and are only pre-treated or salted once Level I and II streets are completed.

8. What are Level 4 routes?

All other local neighborhood streets are categorized as Level 4. The decision and ability of the Public Works Department to clear Level 4 routes is based on a number of factors including current weather conditions, salt/chemical reserves and the threat of additional inclement weather. A listing of street designations is available at the bottom of this page.

9. What resources does the City have to remove snow?

The Public Works Department can call on over 45 employees, 14 pieces of snow removal and de-icing equipment, and 1500 tons of salt during snow removal operations.

10. Who do I contact in an emergency?

For all life threatening emergencies, contact 911. Call the Police and Fire Departments at 911 only in life threatening emergencies or for emergency Fire and Rescue services.

11. Whom do I contact about a non-emergency?

Contact the Public Works Department by calling 865-425-1875

STREET PRIORITY DESIGNATIONS

Level 1 Streets (80 lane miles)

- Edgemoor Road (SR 170)
- North Illinois Avenue (SR 62)
- South Illinois Avenue (SR 62)
- Oak Ridge Turnpike (SR 95)
- Solway Bridge (SR 62)
- Edgemoor Bridge (SR 170)
- Hospital adjacent streets

Level 2 Streets (95 lane miles)

- Bear Creek Road (Water Plant)
- Bethel Valley Road
- Briarcliff Avenue
- Bus Terminal Road
- Emory Valley Road
- Fairbanks Road
- Florida Avenue
- Georgia Avenue
- Gum Hollow Road
- Jefferson Avenue
- Laboratory Road
- Lafayette Drive
- Melton Lake Drive
- New York Avenue
- ORAU Way
- Outer Drive
- Pennsylvania Avenue

- Robertsville Road
- Rutgers Avenue
- Scarboro Road
- E. Tennessee Avenue
- W. Tennessee Avenue
- S. Tulane Avenue
- Tulsa Road
- E. Tulsa Road
- Tuskegee Drive
- West Outer Drive
- Whippoorwill Drive
- Wisconsin Avenue

Level 3 Streets (50 lane miles)

- Alger Road
- Amanda Drive
- Athens Road
- Arkansas Avenue
- Baltimore Drive
- Broadberry Street
- California Avenue
- Center Park Drive

Level 3 Streets (continued)

Centrifuge Way
S. Columbia Drive
Commerce Park Drive
Cumberland View Drive
Dana Drive
Dayton Road
Delaware Avenue
East Drive
ETTP Streets
Glassboro Drive
Greystone Drive
Hendrix Drive
Highland Avenue
Hillside Road
Kentucky Avenue
Louisiana Avenue
Manchester Road
Manhattan Avenue
E. Melbourne Road
Michigan Avenue
Middlebury Road
Mississippi Avenue

Montana Avenue
Monterey Road
Nebraska Avenue
Morningside Drive
Newport Drive
Newridge Road
Palisades Parkway
Park Meade Drive
Providence Road
Rivers Run Boulevard
Rivers Run Way
Riverside Drive
Rockingham Lane
Rolling Links Boulevard
Salem Road
N. Tulane Avenue
Union Valley Road
E. Vance Road
Vanderbilt Drive
Weinberg Drive
Wilberforce Avenue
William Lane
Winchester Circle

Quick Facts about the Salt Brine Program

- The ability to pretreat with brine when a storm is predicted results in Public Works not having to respond the instant snowfall begins in order to get ahead of the weather.
- The cost of salt has increased from \$34/ton to \$100/ton in the last few years and the ability to purchase an additional supply is limited during the winter months.
- TDOT will reimburse the City for brine application on State highways.
- Due to the ability to pretreat, many of the streets have been moved up in ranking from the traditional plowing and salting method and will be pretreated when conditions permit.
- Due to the lower cost of materials and manpower the City has found that when roads are pretreated and it either rained or the predicted winter weather did not occur we would have to be wrong several times before the cost of pretreating would equal the cost of the traditional method. Recent history proves that the City can cover more than 20 lane miles of streets with brine using the same amount of salt that would cover only one lane mile using the traditional method.
- The City has the ability to store 10,000 gallons of brine solution, enough to pretreat all of the Level 1, 2 and 3 streets and can manufacture approximately 1600 gallons of brine per hour.
- 2 trucks pulling trailers carrying 1000 gallon tanks will place the brine on the streets. These trailers are well marked so the public will be warned that the brine solution is being placed. The trailers are equipped with multiple rear strobe lights to warn the

motoring public of a slower moving vehicle on the roadway. The trailers have been equipped with a splash guard to prevent brine from splashing onto vehicles behind them.

- The liquid brine solution will only cover approximately 10% of the road surface so there is little danger in creating slick roads during the application process.
- Many of the Level 4 streets are short, relatively flat streets that have a limited turning area and/or on-street parking that a snowplow or a truck and trailer with a combined length of 40 feet simply cannot maneuver safely on icy streets. The minimum turning radius for a brine application vehicle is 60 feet on dry pavement
- The brine solution can also be used to pretreat the sidewalks and steps at the publicly used buildings and can make for a safer entrance and also reduce the tracking of chemicals into the building.
- Industry estimates are that the impact of introducing salt to the environment is reduced by at least 30 % using the brine solution in conjunction with the traditional method and the environmental impact is many times less if additional salting of the roads is not required.
- Many of the snow events we experience in Oak Ridge occur overnight and leave measurable precipitation in the 1 to 3 inch range. If brine has been placed on the streets prior to the event and the weather is predicted to warm up then the need for applying additional salt will be reduced or eliminated.

Below is an example of resources used for both the traditional and new brine methods to treat all level 1 & 2 streets and the potential cost savings with the brine method.

Traditional Salt Methods		New Salt Brine Methods	
Level 1 and 2 streets (lane miles)	134	Level 1 and 2 streets (lane miles)	134
Tons of salt required	60	Tons of salt required	6
Number of employees required	14	Number of employees required	3
Number of trucks required	10	Number of trucks required	2
Cost for salt @ \$90/ton	\$5400	Cost for salt @ \$90/ton	\$540
Estimated Time for treatment	5 hours	Estimated Time for treatment	10 hours
Estimated Man hours for treatment	70	Estimated Man hours for treatment	30

Past usage shows that when brine can be applied in advance of storms the labor costs are substantially reduced since the product is most often applied during a regular work shift thus reducing overtime costs. Other advantages found were a safer application due to daytime and dry roadway conditions and that the reduced salt usage is better for the environment.

